Claims

What is claimed is:

1. A self-sustained atmospheric pressure system for absorbing or scattering electromagnetic waves, comprising:

an electromagnetic source for producing electromagnetic waves;

a plasma panel disposed to receive incident thereon electromagnetic waves produced by the electromagnetic source, the plasma panel comprising:

a first dielectric having at least one capillary defined therethrough;

a segmented electrode disposed proximate and in fluid communication with the at least one capillary;

a second electrode having a first surface disposed closest towards the first dielectric and an opposite second surface, the second electrode being separated a predetermined distance from the first dielectric, the first surface of the second electrode being coated with a second dielectric layer, the assembled second electrode and second dielectric layer having at least one opening defined therethrough;

a power supply electrically connected to the plasma panel, the power supply being turnable on and off, a non-thermal plasma being generated between the first dielectric and second dielectric only while the power supply is on; and

a detector for receiving scattered electromagnetic waves reflected off of the plasma panel.

2. The system in accordance with claim 1, wherein the plasma is substantially uniform and the plasma panel absorbs substantially all incident electromagnetic waves.

3. The system in accordance with claim 1, wherein the plasma is non-uniform and the plasma panel reflects at least some of the incident electromagnetic waves.

4. The system in accordance with claim 3, wherein the electromagnetic source emits multiple wavelength electromagnetic waves, and the plasma panel scatters waves reflected from its surface in different directions according to their respective individual wavelengths.

5. The system in accordance with claim 4, wherein the degree of separation between the various wavelength components depends on arrangement of and spacing between the capillaries.

6. The system in accordance with claim 1, wherein the opening and capillaries are arranged substantially concentric with one another.

7. The system in accordance with claim 1, wherein the diameter of the capillary is greater than the diameter of its associated opening.

8. The system in accordance with claim 1, wherein the opening and capillary have a circular cross-sectional shape.

9. The system in accordance with claim 1, wherein the plasma panel further comprises a cover separated a predetermined distance from the second surface of the second electrode by a spacer, the cover substantially prohibiting passage of electromagnetic waves therethrough.

10. The system in accordance with claim 1, wherein the second surface of the second electrode is coated with the second dielectric.

11. A method for controlling exposure of an object disposed behind a plasma panel to electromagnetic waves using a system including an electromagnetic source for directing incident electromagnetic waves to a plasma panel electrically connected to a power supply to produce plasma, the method comprising the steps of:

illuminating the object with electromagnetic waves generated by the electromagnetic source; and

controlling the generation of plasma by varying the supply of power to the plasma panel, the plasma panel comprising:

a first dielectric having at least one capillary defined therethrough;

a segmented electrode disposed proximate and in fluid communication with the at least one capillary;

a second electrode having a first surface disposed closest towards the first dielectric and an opposite second surface, the second electrode being separated a predetermined distance from the first dielectric, the first surface of the second electrode being coated with a second dielectric layer, the assembled second electrode and second dielectric layer having at least one opening defined therethrough.

12. The method in accordance with claim 11, wherein said controlling step comprises varying at least one of level and duration of exposure of the object to electromagnetic radiation.

13. The method in accordance with claim 11, wherein the plasma is substantially uniform.

14. The method in accordance with claim 13, wherein the controlling step comprises blocking substantially all of the electromagnetic rays from reaching the object by turning on the power supply to generate the plasma and allowing substantially all of the electromagnetic waves to reach the object by turning off the power supply to cease generating the plasma.

15. The method in accordance with claim 11, wherein the controlling step comprises pulsing on and off the power supply.

16. The method in accordance with claim 15, wherein the pulses are periodic or non-periodic.

17. The method in accordance with claim 11, wherein the electromagnetic source is continuous.

18. The method in accordance with claim 11, wherein the electromagnetic source is modulated.

19. The method in accordance with claim 18, further comprising the step of synchronizing the electromagnetic source and the power source.

20. The method in accordance with claim 11, wherein the plasma is non-uniform and the controlling step comprises reflecting at least some of the electromagnetic waves incident on the plasma panel.

21. The method in accordance with claim 20, wherein the electromagnetic source emits multiple wavelength electromagnetic waves, and the plasma panel scatters waves reflected from its surface in different directions according to their respective individual wavelengths.

22. The method in accordance with claim 21, wherein the degree of separation between the various wavelength components depends on arrangement of and spacing between the capillaries.

23. The method in accordance with claim 11, wherein the opening and capillaries are arranged substantially concentric with one another.

24. The method in accordance with claim 11, wherein the diameter of the capillary is greater than the diameter of its associated opening.

25. The method in accordance with claim 11, wherein the openings and capillaries have a circular cross-sectional shape.

26. The method in accordance with claim 11, wherein the plasma panel further comprises a cover separated a predetermined distance from the second surface of the second electrode by a spacer, the cover substantially prohibiting the passage of electromagnetic waves therethrough.

27. The method in accordance with claim 11, wherein the second surface of the second electrode is coated with the second dielectric.